III. REMARKS

In the Office Action, claims 1-5, 7-20, 22-27 and 29-32 were rejected under 35 U.S.C. 103 as being unpatentable over Carsello (US 7,203, 254) in view of Fulghum (US 6,728,326) for reasons set forth in the Action.

With respect to the rejections under 35 U.S.C. 103, various ones of the claims are amended and the following argument is presented to distinguish the claimed subject matter from the teachings of the cited art, considered individually and in combination, thereby to overcome the rejections and to show the presence of allowable subject matter in the claims.

The present specification (middle of page 2) discloses to reduce the time required for performing a frequency correction by using a predefined portion of a burst of a received signal, such as a signal received at a mobile station. To obtain this benefit, the specification (last two paragraphs of page 5) discloses a frequency synthesizer that provides a reference for the generation of other frequencies for use in the coupling of a baseband subsystem to an RF subsystem for the reception of baseband signals. Furthermore, the baseband subsystem generates a frequency correction signal to be fed to the frequency synthesizer for control of a reference oscillator of the synthesizer. Signals received by the antenna (Fig. 3, and middle of page 6) are down converted to baseband by a mixer for use by a base band DSP (digital signal processor). The mixer is operated with an output signal of the frequency synthesizer (Fig. 3).

To obtain the frequency correction signal, the specification (Fig. 4, and the paragraph linking pages 6-7) teaches the use of correlation, wherein the mid-amble symbols of the current burst of a received signal are correlated against each of nine training sequences of the base transceiver sites (BTS 1, 2 of Fig. 1). An index identifying the best

correlation is stored for use by a bit detector and an SNR (signal-to-noise ratio) estimator for operation of a frequency estimator (middle of page 7).

In the operation of the frequency estimator, use is made of pairs of samples taken from ends of the burst to obtain a phase shift between the samples in each of the sample pairs (bottom of page 7). As noted (beginning at the middle of page 10) in the specification, the training sequence need not be contained in a mid-amble and may be located in other positions in a burst, and a single training sequence, rather than multiple training sequences, may be employed. The practice of the invention is based on use of a known burst content to obtain a frequency correction.

The cited Carsello teaches (Col. 1 at lines 5-35) synchronization of digital communication employing frequency shift keying (FSK), and the need for synchronization in order to maintain frequency accuracy. As noted at lines 30-32, it is necessary to synchronize a received signal with a transmitted signal with respect to both time and frequency. Carsello's goal is to obtain the synchronization in an efficient manner.

Carsello teaches (paragraph linking columns 1-2) the formation of multiple correlations corresponding to a selected sync symbol interval, relative to the current time instant, obtained by correlating a received signal with a sinusoid of an expected frequency for each of selected sync symbol intervals. There follows a phase correction of the correlations, and the forming of a vector of multiple sync symbol correlations. The correlations are phase-corrected in accordance with the FSK modulation index and known sync symbol pattern. Then, by locating the peak of the sync correlation signal, there is established a symbol timing in accordance with the correlation peak.

The examiner cites a passage (bottom of page 2 of the Action) with reference to a VCO of Carsello for controlling a mixing frequency, namely, a frequency synthesizer (28, 15) for generating a local oscillator signal for operation of a mixer, wherein the synthesizer includes a tunable oscillator (Carsello in col. 5 at lines 8-28).

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Carsello (col. 5 at lines 24-29) teaches the use of a DSP 42 to provide an estimate of frequency offset, which estimate is employed, by modifying a divide modulus of a Frac-N synthesizer, to modify the frequency of the VCO. The DSP employs a sync symbol correlator 220 (top of col. 10) to enable detection of a sync word 310 even when a frequency error is present. Subsequently, the symbol correlator outputs, when synchronized in time (line 11), are employed for estimation of the frequency offset. Note that the frequency estimation (performed by the estimator 260, col. 11 at line 9) occurs after the symbol timing has been established (col. 10 at line 52).

With respect to the presently claimed subject matter, the following distinction is noted between the teachings of the present specification and the teachings of Carsello.

The Carsello communication system operates in an environment wherein the frequency of the received signal is continually jumping because of the frequency shift keying. Therefore, in order to ascertain the correctness of the received frequency, it is necessary to determine first the correctness of the time frame of the received signal. Therefore, as noted above, the frequency estimation of Carsello occurs after the symbol timing has been established. As noted above, the symbol timing is obtained by use of correlation for detection of a sync word, which correlation is able to function adequately even if the frequency is not accurate.

In the presently claimed subject matter, frequency estimation is accomplished by using pairs of samples taken from a communication burst, wherein one of the samples is taken from one end of a burst interval, and the other one of the samples is taken from a second end of the burst interval, as discussed above with reference to the teachings of the present specification (bottom of page 7). Correlation is employed with a training sequence to obtain a best estimate of the burst interval for improved accuracy in the frbbbbbequency estimation process, but the estimation process is based on a spacing between the samples in a pair of the samples (present specification in bottom of page 7) independent of the correlation process.

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The independent claims are amended to emphasize the foregoing distinction, by stating that the frequency correction signal generator operates upon a pair of samples of one of said bursts, wherein one sample of said pair of samples of said burst is distant from a second sample of said pair of samples. Thereby this amendment is believed to overcome the rejections under 35 U.S.C. 103, and to obtain allowable subject matter in the claims.

For all of the foregoing reasons, it is respectfully submitted that all of the claims now present in the application are clearly novel and patentable over the prior art of record, and are in proper form for allowance. Accordingly, favorable reconsideration and allowance is respectfully requested. Should any unresolved issues remain, the Examiner is invited to call Applicants' attorney at the telephone number indicated below.

The Commissioner is hereby authorized to charge payment of $810 for the Request for Continued Examination, $120 for a one month extension of time and for any other fees associated with this communication or credit any over payment to Deposit Account No. 16-1350.

Respectfully submitted,

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